FACTORS INFLUENCING HAND HYGIENE COMPLIANCE AMONG NURSES: AN INTEGRATIVE REVIEW

Sarah Winship

Patricia McClunie-Trust

About the authors: *Sarah Winship, RN, MN, is a perioperative staff nurse and infection prevention and control clinical nurse specialist at Whakatane Hospital, Whakatane, New Zealand. Her correspondence address is: Sarah.Winship@bopdhb.govt.nz*

Patricia McClunie-Trust, RN, PhD, is a principal lecturer at the Centre for Health and Social Practice, Waikato Institute of Technology, Hamilton, New Zealand.

ABSTRACT

The aim of this integrative review was to appraise primary research to identify factors influencing qualified nurses' hand hygiene compliance during patient care. Health-care associated infections (HAI) adversely affect patient health outcomes during hospital admissions, raising morbidity and mortality rates, extending lengths of hospital stay, and increasing health-care costs.

An integrative review approach was used to appraise primary research on nurses' hand hygiene compliance. The PRISMA model (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was used as the structure for the review. The appraisal revealed five key themes, including time constraints and busyness; hand hygiene as self-protection for nurses and self-analysis of risk; awareness of being watched; converting knowledge into action and changing intention into behaviour; and social pressure and role modelling.

Despite evidence that hand hygiene among nurses is improving slowly, it is evident that there is further improvement to be made for hand hygiene to become a consistent part of competent nursing practice.

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KEYWORDS

Factors influencing, nurse, compliance, hand hygiene.

INTRODUCTION

One of the most effective methods of preventing health-care associated infections (HAIs) is the implementation of standardised hand hygiene regimes. The aim of this integrative review was to appraise primary research as evidence to promote more consistent hand hygiene practices among nurses and to improve patient safety by adhering to recognised standards for hand hygiene. The central question underpinning this review is:

What are the factors influencing the hand hygiene compliance of nurses?

BACKGROUND

HAIs adversely affect patient safety and health outcomes during hospital admissions. They raise morbidity and mortality rates, increase the cost of health care, extend lengths of stay and delay recovery from illness, injury or surgery (Abela & Borg, 2012; Kowitt, Jefferson, & Mermel, 2013; Picheansathian, Pearson, & Suchaxaya, 2008; Randle, Arthur, & Vaughan, 2010). In New Zealand, it is estimated that between $50 million and $85 million dollars per year is spent on these preventable infections (Burns, Bowers, Pak, Wignall, & Roberts, 2010). One of the most effective methods of preventing HAIs is hand washing and the implementation of standardised hand hygiene regimes for practice (Allegranzi & Pittet, 2009; Sax et al, 2009). Direct observation auditing is widely accepted as the best way of collecting compliance data about hand hygiene among health-care workers (Eveillard et al, 2009; Haas & Larson, 2007; Morgan et al, 2012; Pan et al, 2013), However, it is not clearly established whether effective hand hygiene practice is maintained when health-care workers are not aware of being observed.

In the last 10 to 15 years, there has been a major international focus on combating preventable infections in hospitals through hand-washing initiatives, such as the *My 5 Moments for Hand Hygiene* programme, endorsed by the World Health Organization (Sax et al, 2009; World Health Organization, 2009) and implemented by Australia and New Zealand (Hand Hygiene Australia, 2014; Health Quality & Safety Commission New Zealand, 2012). WHO (2009) defines a "moment of hand hygiene" as "when there is a perceived or actual risk of pathogen transmission from one surface to another via the hands. The 5 Moments for Hand Hygiene are:

- Moment 1: Before touching a patient;
- Moment 2: Before a procedure;
- Moment 3: After a procedure or body fluid exposure risk;
- Moment 4: After touching a patient; and
- Moment 5: After touching a patient's surroundings."

These guidelines are routinely audited in New Zealand hospitals and used as a key safety marker in the delivery of safe health care (Health Partners Consulting Group, for the Health Quality and Safety

Commission, 2014).

As health-care professionals, nurses have more "hands on" contact with patients than other health team members, and therefore a greater number of opportunities for hand hygiene to occur during routine patient care in acute hospital settings (Darawad, Al-Hussami, Almhairat, & Al-Sutari, 2012). Yet, despite this fact, many studies on hand hygiene have focused on the medical profession, as their compliance has been deemed the poorest among health-care workers, both locally and globally (Health Partners Consulting Group, for the Health Quality and Safety Commission, 2014; Michaelsen, Sanders, Zimmer, & Bump, 2013; Sladek, Bond, & Phillips, 2008).

BARRIERS TO HAND HYGIENE COMPLIANCE

Literature on noncompliance with hand hygiene programmes has frequently concentrated on barriers, including lack of resources, poor education and deficiencies in providing feedback (Howard et al, 2009; Kowitt et al, 2013; Pincock, Bernstein, Warthman, & Holst, 2012). Another potential barrier is the presence of the phenomenon known as the "Hawthorne effect", in which workers temporarily act in a different way than they would normally because they know they are being watched (Kohli et al, 2009). This phenomenon has been noted to occur during the collection of hand hygiene auditing data (Assanasen, Edmond, & Bearman, 2008; Eveillard et al, 2009; Huis et al, 2013).

THE INTEGRATIVE REVIEW METHOD

The integrative review approach enables the aggregation and appraisal of the findings from both qualitative and quantitative research (Whittemore & Knafl, 2005). This integrative review used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) model, which is a screening tool for data selection and evaluation (Moher, Liberati, Tetzlaff, & Altman, 2009). The data analysis involved three separate sub-processes – iterative, deductive and coding processes to identify and analyse findings of the primary research studies that were used as data for the review.

Iteration is a reflexive process used to make meaning from research data. Findings from the primary studies were subjected to cycles of analysis, revisiting data as patterns emerged, undertaking new cycles as insight was sparked and new patterns emerged (Srivastava & Hopwood, 2009). Similarly, the process of deductive analysis was used, beginning with a broad spectrum of information on the topic of hand hygiene generally, and then narrowing it down into more specific hypotheses relating to compliance among nurses by following a logical progression (Reyes, 2004). A coding structure was established to group the information, so refined themes could be developed (Hahn, 2008). Each primary study was also given a number, to provide ease of readability of the integrative review data.

Search methods

Online databases EbscoHost, CINHAL, OAIster, ProQuest and ScienceDirect were accessed to find primary research on factors influencing adherence to hand hygiene initiatives. Some background literature and secondary studies were also retrieved. Reference lists from applicable articles were further hand-searched for other relevant studies for inclusion. Research from 2000 until the present day was examined. The search was limited to those studies involving health-care facilities such as hospitals, as opposed to veterinary clinics and dentistry offices. Phrase-searching used several keywords, including "hand hygiene", "nurses" and "factors influencing". To obtain the most pertinent information, articles needed to include all of these three specific keywords, and pertain to health care.

Search inclusions and exclusions

The inclusion criteria were set as primary research studies on factors influencing nurses' adherence to effective hand hygiene practice. Much of the literature found pertained to health-care workers as a general group, or pertained to other disciplines, such as doctors, and not specifically to nurses; some of this information was used for the background discussion rather than as data. The term "nurse" used throughout the review refers to a qualified nurse, either registered or enrolled, regardless of length of experience or gender; it does not include nursing students or health-care assistants. There were no geographical limitations imposed on studies used for the review, with most of the included primary research originating from sources outside of Australasia – apart from one study carried out in Australia.

DATA SELECTION PROCEDURE

From the studies that met all the inclusion criteria, 11 primary research studies were chosen (see Table 1, opposite). These were selected using the flowchart shown below in Figure 1, based on the PRISMA model, previously discussed (Moher et al, 2009).

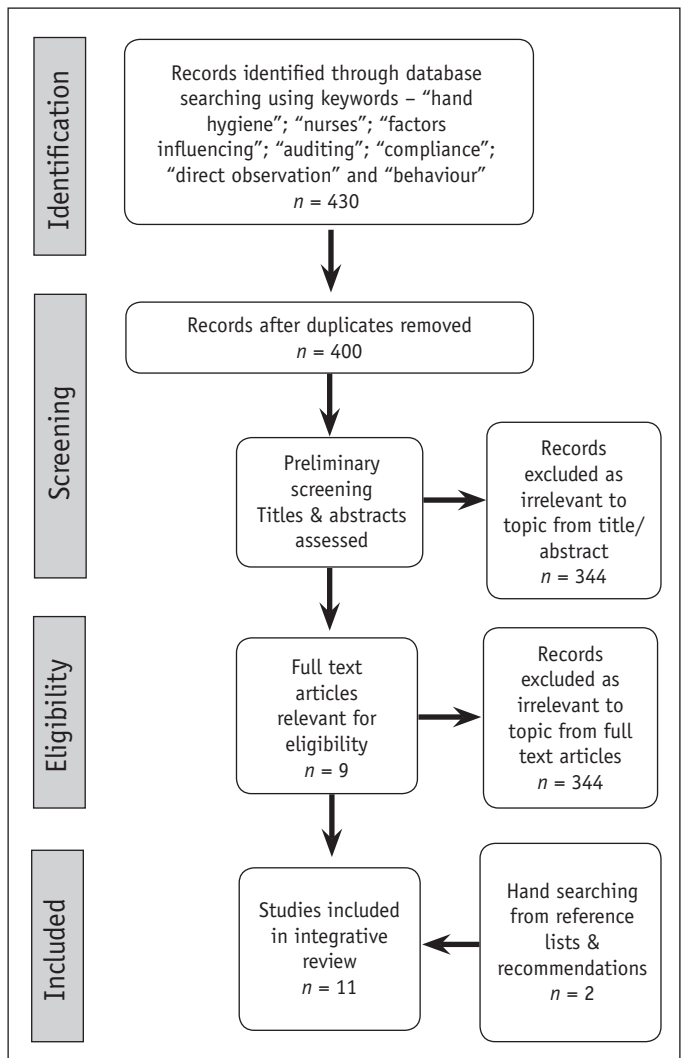

Figure 1. Flowchart of search and screening process

Adapted from Moher et al (2009)

Table 1. Summary of studies selected as data

Authors	Population	Design	Findings
[1] Whitby M, McLaws ML & Ross M (2006) **Why Healthcare Workers Don't Wash Their Hands: A Behavioural Explanation**	Children *n* = 64 – (8 boys and 8 girls each) Mothers *n* = 64 Nurses from 2 tertiary hospitals. *n* = 754 (questionnaire) *n* = 64 (focus group) AUSTRALIA	Grounded theory using focus group discussions and semi structured interview technique	Handwashing as self-protection when nurses deemed themselves to be "at risk". Ritual behaviour. Presence of motivating factors to prompt handwashing. Self-assessment of risk based on required task. Time constraints balanced against risk. Facilitation of compliance not related to effort but highly dependent on altering behavioural perceptions.
[2] Korniewicz D & El-Masri M (2008) **Exploring the factors associated with hand hygiene compliance of nurses during routine clinical practice**	Staff members (health-care professionals) at an oncology centre *n* = 67 with 612 observed procedures USA	Observational study 2 questionnaires and data analysis using Statistical Package for Social Sciences.	Overall compliance was relatively low. Pre procedure was much lower than post procedure handwashing. Aware of being watched but still had low compliance. More compliant when participating in high-risk procedures. Females less compliant than males until other variables accounted for, then reversed.
[3] Song X, Stockwell D, Floyd T, Short B & Singh N (2013) **Improving hand hygiene compliance in health-care workers: Strategies and impact on patient outcomes**	Inpatient units (13) and the emergency department (1) 1433 observations pre intervention 9580 observations post intervention USA	Multi methods Prospective observational study and retrospective cohort study	Significant association between hand hygiene compliance and the acquisition of MRSA in the neonatal intensive care unit.
[4] Sharma Sarit, Sharma Shruti, Puri S & Whig J (2011) **Hand Hygiene Compliance in the Intensive Care Units of a Tertiary Care Hospital**	Doctors and nurses in the ICUs of a tertiary hospital of Punjab. 911 opportunities for all health-care workers with 728 opportunities for nurses INDIA	Cross-sectional study	Nurses (79.9%) performed better than doctors (20.1%). Nurses – highest number of HH opportunities. Compliance lower relative to activity index. Most HCW perceived HH as useful measure but knowledge not converted to action.
[5] Darawad MW, Al-Hussami M, Almihairat I I & Al-Sutari M (2012) **Investigating Jordanian nurses' handwashing beliefs, attitudes, and compliance**	Registered nurses and nursing assistants working at governmental hospitals. JORDAN	Cross-sectional study with questionnaire	Some nurses stated that handwashing caused a harmful effect to their hands. Although aware of the benefits of handwashing, many nurses viewed it as "frustrating and unnecessary". Cultural differences were highlighted as it appeared "Jordanian nurses care first about their own safety and less when it comes to patient safety".
[6] Knoll M, Lautenshlaeger C and Borneff-Lipp M (2010) **The impact of workload on hygiene compliance in nursing**	Nursing staff Ten hospital depts. 4x surgical wards, 4x internal medicine wards and 2x intensive care units. GERMANY	Prospective study using observation trials and narrative interviewing	Handwashing felt to be too time-consuming, Forgot to do, stress, poor technique. Deficits in knowledge thought to have implications for compliance. Hand hygiene experts have little effect on compliance when compared with continuous education for nursing staff showing a higher level of significance in improving compliance. Hawthorne effect was consciously employed as a method of motivating behavioural change.
[7] De Wandel D, Maes L, Labeau S, Vereecken C & Blot S (2010) **Behavioural Determinants of Hand Hygiene Compliance in Intensive Care Units**	Intensive care nurses in one ICU at a university hospital USA	Behavioural theory model with questionnaire using self-reported compliance scale	Increased work pressure in ICU did not seem to have direct influence on HH behaviour which contradicts other studies. Use of irritating and drying solutions for hand disinfection identified as a barrier. Social pressure to conform was low. Negative attitude toward time-related barriers are predictors of poor compliance with recommendations for HH.
[8] O'Boyle CA, Henly SJ & Larson E (2001) **Understanding adherence to hand hygiene recommendations: The theory of planned behaviour**	Registered nurses employed in critical care (*n* = 70) and post critical care (*n* = 50) units *n* = 120 total USA	Observational study and structural equation modelling to test theory of planned behaviour (TPB) -based model	The correlation between self-reported and observed adherence to handwashing recommendations was low (*r* = 0.21). TPB variables predicted intention to hand wash, and intention was related to self-reported hand hygiene. Intensity of activity in the units at the time of observation was significantly and negatively associated with observed adherence to HH recommendations.

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Table 1. Summary of studies selected as data (continued)

Authors	Population	Design	Findings
[9] Buffet-Bataillon S, Leray E, Poisson M, Michelet C, Bonnaure-Mallet M & Cormier M (2010) **Influence of job seniority, hand hygiene education and patient to nurse ratio on hand disinfection compliance**	11 surgical and 35 medical wards were randomly selected in 2006. In 2007 the 35 wards included 11 of the wards selected in 2006. 39% RNs in 2006. *n* = 60 from *n* = 156 total 62% RNs in 2007 *n* = 370 from *n* = 605 total FRANCE	Bivariate analysis – Fishers exact test and multivariate analysis using audit and questionnaires	761 hand hygiene opportunities were identified. Following the promotional programme, the partial and overall compliance improved with increased use of alcohol-based hand-rub (ABHR). Multivariate analysis identified job seniority and health-care worker (HCW) type as independent predictors of partial compliance. Adherence to hand hygiene was associated with the awareness of being observed, role modelling for colleagues, positive attitude and access to hand-rub solution.
[10] Erasmus V, Kuperus MN, Richardus JH, Vos MC, Oenema A & van Beeck EF (2010) **Improving hand hygiene behaviour of nurses using action planning: a pilot study in the intensive care unit and surgical ward**	Nurses from a university teaching hospital *n* = 9 surgical ward nurses n=8 ICU nurses NETHERLANDS	Observational intervention study including interview	Action planning allows nurses to plan how they would fit proper hand hygiene into their routine. Action planning potentially overcomes the intention-behaviour gap producing greater hand hygiene compliance in practice. It is feasible to use action planning as a change strategy.
[11] Jackson C, Lowton K & Griffiths P (2013) **Infection prevention as "a show": A qualitative study of nurses' infection prevention behaviours**	Registered nurses undertaking part-time post-qualification education at university *n* = 20 ENGLAND	Interpretative qualitative study using interviewing and thematic analysis	Despite training and education, compliance with good practice remains variable. Nurses rationalise their own behaviour even if they recognise that it does not fit with recommended practice. Nurses condemned inappropriate behaviour they witnessed in others, despite rationalising their own practice. Role-modelling of correct procedure and leading by example were seen to be the basis of improving practice; however concern was raised that an incorrect display would do more harm than good.

THEMATIC ANALYSIS

Thematic analysis was used to aggregate textual data from the findings of primary research to find commonalities (Srivastava & Hopwood, 2009). The studies appraised revealed five core themes as influential factors associated with hand hygiene among nurses:

1) Time constraints and busyness;
2) Hand hygiene as self-protection for nurses and self-analysis of risk;
3) Awareness of being watched;
4) Converting knowledge into action and changing intention into behaviour; and
5) Social pressure and role modelling.

1) Time constraints and busyness

The predominant theme among the 11 studies was that time constraints and busyness led to a reduction in hand hygiene compliance [1, 4, 6, 7, 8]. Sharma, Sharma, Puri and Whig (2011) showed that when there were more than 20 possible opportunities to perform hand hygiene, the compliance rate was only 38.2 percent. Conversely, when there were fewer than 10 opportunities, the compliance level increased to 52.1 percent. Others also showed this link with activity levels (De Wandel, Maes, Labeau, Vereecken, & Blot, 2010; Knoll, Lautenschlaeger, & Borneff-lipp, 2010; Whitby, McLaws, & Ross, 2006), but O'Boyle, Henly and Larson (2001) reported that the intensity of the activity was also a significant contributing factor that negatively affected hand hygiene compliance (r = -0.32). Study [6] called this a "stress factor", showing a perceived imbalance between work effort required and available time in which to perform. This finding was confirmed when n = 24 / n = 181 participants identified this stress factor as the main reason for non-compliance during a follow-up interview (Knoll et al, 2010). However, De Wandel et al (2010) contradicted this finding, suggesting that increased work pressure did not seem to have a direct influence on the hand hygiene behaviour in the intensive care unit they studied.

2) Hand hygiene as self-protection for nurses and self-analysis of risk

Several studies [1, 2, 5] identified that hand hygiene was used as a means of self-protection by nurses, who deemed that the patient care they were giving was in some way "dirty" or high risk. Whitby, McLaws and Ross (2006) determined that two types of behaviour were present among nurses – inherent behaviour in which handwashing was undertaken when hands were visibly or tactilely soiled, or if a procedure was deemed to be universally considered dirty, such as changing a urine bag or changing a wound dressing. This inherent behaviour appeared to be more prevalent than the second type of hand hygiene behaviour – elective, where it seemed that it was the role of the individual nurse to determine whether handwashing should occur (Whitby et al, 2006). In study [2], it was noted that post-procedure hand hygiene adherence, which is "thought to protect the health-care worker" more, was much higher, at 72.1 percent, than pre-procedure compliance – "thought to protect the

patients", which was only 41.7 percent (Korniewicz & El-Masri, 2010). Similarly, results from Darawad, Al-Hussami, Almihairat and Al-Sutari (2012) showed an average compliance of 87.83 percent when nurses had contact with patients' body fluids or with instruments, as opposed to 55.2 percent on completion of patient care. The Darawad et al study also involved an observer determining if a procedure was low or high risk. They found that even though 22.5 percent of these procedures were considered high risk, only 12.6 percent of nurses undertaking these high-risk procedures complied with hand hygiene standards. This finding could suggest that self-analysis of risk may not always be congruent with best practice in hand hygiene.

3) Awareness of being watched

When carrying out overt observational studies, such as those used to measure hand hygiene compliance, researchers noted that many participants were aware of being watched [2, 6, 8, 9], and, in some cases, altered their behaviour. This phenomenon, known as the "Hawthorne effect", was consciously employed by Knoll, Lautenshlaeger and Borneff-Lipp (2010) to motivate behavioural change, but despite this only 51.9 percent adherence was recorded. Study [8] used self-selected volunteers as participants, so these participants may have been more conscientious in their practice, as they chose to participate and were fully aware they were being observed. However, regardless of this possibility, the overall compliance rate in the study was just 70 percent (O'Boyle, Henly, & Larson, 2001). The Hawthorne effect was also noted in research by Buffet-Bataillon et al (2010), where, although the participants were not volunteers, they were aware of being watched due to the method used to collect data. In initial results, the hand hygiene compliance rate among nurses was 39 percent, and, when repeated a year later, had improved to 62 percent. In study [2], by Korniewicz and El-Masri (2008), the participants were aware of being observed but still continued to have low compliance, although it was acknowledged that observer bias may also have been a factor in this discrepancy.

4) Converting knowledge into action and changing intention into behaviour

Many nurses were aware of the importance of hand hygiene in the prevention and control of infection [1, 4, 5, 7]; however, there was not a corresponding reflection of this awareness in compliance results (Darawad et al, 2012; De Wandel et al, 2010; Sharma, Sharma, Puri, & Whig, 2011; Whitby et al, 2006). In study [5], Jordanian nurses acknowledged that hand hygeiene was a protection for themselves, their families and their patients, but still described it as frustrating and unnecessary (Darawad et al, 2012). This finding highlights either a gap in knowledge, or the inability of some nurses to translate theoretical information into behavioural change in practices relating to hand hygiene. De Wandel et al (2010) asked a group of nurses to answer questions that measured their self-reported compliance, and they scored at 82 percent. The participants were also questioned about their knowledge of infection prevention and control principles relating to hand hygiene, scoring only 53 percent. The findings of this research show that while these participants thought they would be able to correctly comply with hand hygiene practices, they were lacking the knowledge required to make this happen.

5) Social pressure and role modelling

Some studies [7, 10, 11] acknowledged a social element in research findings that influenced adherence to hand hygiene (De Wandel et al, 2010; Erasmus et al, 2010; Jackson, Lowton, & Griffiths, 2014). However, De Wandel et al (2010) identified that social pressure, although present, did not have a significant effect on an individual's hand hygiene conformity, with participants reporting that their noncompliance did not result in negative feedback or criticism from their colleagues. Jackson et al (2013) found nurses were critical of noncompliant behaviours in their colleagues, but tended to rationalise that same behaviour in their own practice. This study identified role modelling, or peer example, as a means of improving practice through display of correct behaviours among colleagues. It was thought that if a right behaviour was repeated and witnessed many times, it would then become the norm of routine hand hygiene practice (Jackson et al, 2014). However, this idea could also be applied to bad practices, and thus had the potential to adversely affect overall compliance results if nurses were imitating each other's behaviours inappropriately without sound knowledge of good practice. Erasmus et al (2010) found that an intention-behaviour gap in hand hygiene practices could be modified through the use of action planning in a group setting, with a multi-faceted approach that included social variables as a strategy for change.

DISCUSSION

With a greater emphasis on fiscal responsibility and careful allocation of resources in health-care facilities, many hospital units and wards are frequently understaffed, increasing pressure to carry out routine tasks with unmanageable time constraints (Sharma et al., 2011). Heavy workloads can have a potentially detrimental effect on patient care, and, in particular, on hand hygiene practices. Not only is "busyness" a factor, but also increased stress levels in the workplace, which are reflected in an imbalance between work required and time available to provide nursing care to an accepted standard (Knoll et al, 2010). Although time constraints are a difficult factor to control, due to the unpredictability of health care, effective time management and the increased use of alcohol-based hand rubs, as an alternative to soap and water, could go some way to improving practice (Larmer, Tillson, Scown, Grant, & Exton, 2008; Lebovic, Siddiqui, & Muller, 2013; Whitby, McLaws, Slater, Tong, & Johnson, 2008). The introduction of alcohol-based hand rubs at appropriate locations has helped increase hand hygiene at the point of care and is subsequently saving valuable time for nurses (Aziz, 2013; Boog et al., 2013; Lebovic et al., 2013).

Nurses unhappy at working under time pressure are less likely to carry out expected hand hygiene practices (De Wandel et al, 2010). Some nurses perform a self-analysis of risk, in terms of when to carry out hand hygiene, rather than following established guidelines that already take into account the level of risk that may be involved (Darawad et al, 2012; Korniewicz & El-Masri, 2010; Whitby et al, 2006). This self-analysis behaviour seems to be most noticeable when nurses are dealing with body fluids and carrying out procedures that they themselves deem dirty or unclean, in some cases improving hand hygiene practices during self-analysed high-risk exposures. However, due to the subjective nature of self-analysis, it is a much riskier way to practice than following evidence-based guidelines recommended by infection prevention and control experts.

Jackson et al (2012) imply that behaviour and compliance with hand hygiene practices are viewed through a personal lens that is influenced by social theory and an individual's world view. This is

corroborated by other researchers, who have attempted to identify behavioural aspects of hand hygiene compliance (De Wandel et al, 2010; O'Boyle et al, 2001; Whitby et al, 2006). Further investigation into these behavioural aspects may hold the key to gaining a level of compliance that would ensure safe and effective delivery of health care by nurses, both globally and locally. Staff who don't feel included in decision-making, and lack personal ownership of hand hygiene, can create a counterculture within workplaces that manifests as noncompliance to organisational standards (Gurbutt, 2011). Harnessing these staff to serve as link nurses and empowering them within their local areas may hold the key to establishing a level of engagement among groups of nurses that will improve outcomes for patients (Tone, Salonga, Bennett, & Strathern, 2015).

Understanding and explaining the practice behaviours of nurses, from their own point of view, could be an important factor in improving hand hygiene adherence among nurses (Jackson et al, 2014). Leadership that promotes ownership of clinical issues by frontline staff, as opposed to more traditional hierarchical management styles, may be the way forward for nurses to gain control of practice issues relating to hand hygiene and patient safety (Zimmerman et al., 2013). The ultimate goal of achieving hand hygiene adherence to standardised programmes is not negotiable, but using a positive deviance model, in combination with activities that enfranchise nurses in the workplace, could be a way forward in changing nurses' attitudes (Gardam, 2014).

Zimmerman et al (2013) describe a power gradient that exists between traditional management structures and frontline staff, that leads to dysfunction in relationships that ultimately affect nursing practice. Positive deviance acknowledges that solutions may already be there and allows frontline staff to discover and adopt solutions that relate to their own environments (Gardam, 2014). Including nurses involved in direct patient care in decision-making could increase job satisfaction and foster a culture of commitment towards change processes such as hand hygiene regimes and contribute to the overall level of competence seen in nursing practice (Heponiemi et al, 2011). While the actual standards of hand hygiene are not negotiable and there is a need to achieve specified results, the way in which this process is carried out could be more flexible and inclusive (Gardam, 2014).

RECOMMENDATIONS

Point of care

To fulfil organisational requirements and guidelines that require hand hygiene to be performed at point of care, alcohol-based hand rub should be made available at point of care. (Hand Hygiene Australia, 2014; Health Quality & Safety Commission New Zealand, 2012; World Health Organization, 2009). This intervention would also contribute to better workload planning for nurses, as hand rubs are quicker than traditional soap and water. It would also enable nurses to perform point-of-care interventions more effectively as there would be less need to leave the patient.

Infection prevention and control education

Improved education that focuses intensively on knowledge of infection prevention and control, and the links between HAIs and hand hygiene, would reinforce principles of hand hygiene among nurses. Detailed attention to specific nursing tasks and ways to incorporate hand hygiene into routine nursing practice could be taught through the use of scenarios and role play. Teaching nurses how to better align self-risk analysis with proven guidelines may reduce the level of inconsistency in hand hygiene practices. A positive deviance approach may provide a degree of agency for frontline nurses in creating a best-practice hand hygiene culture within the workplace. Participation in decision-making at ground level on hand hygiene matters would promote ownership and an increased sense of self-developed competency in their own nursing practice.

Infection prevention and control resource nurses

The introduction of link or resource nurses, who have advanced training in infection prevention and control, would provide peer role models of good hand hygiene practice. This role-modelling would also flow over into the area of preceptorship, as with developed knowledge of hand hygiene practices, a coaching model could be adopted as praxis, rather than a traditional didactic teaching model.

Auditing

Introduction of local auditing into non-acute areas (in conjunction with national requirements for specified acute areas) may act in the same way as an "observer" for those who respond positively to the Hawthorne effect, and thus improve their compliance. Training of frontline nurses to carry out this local auditing would give ownership of the hand hygiene process and could lead to nurses feeling less threatened during auditing as it becomes a routine and frequent part of patient care.

Cultural considerations

Consideration should be given to the number of Māori nurses working in hospitals and the use of a Kaupapa Māori model in provision of health care. Further research is needed to assess cultural factors influencing hand hygiene practices among New Zealand nurses, specifically among Māori nurses and for Māori patients, whose needs may differ from those of their non-Māori counterparts. To our knowledge, this area of research – hand hygiene by Māori and for Māori in a cultural context – has not been explored at the time of this review.

CONCLUSION

This integrative review has shown that although there has been a substantial amount of research done on the topic of hand hygiene compliance and its links to HAIs, only a small proportion of this research relates specifically to nurses. Furthermore, despite evidence that hand hygiene compliance among nurses is improving slowly, it is evident that further improvement could be made. The implementation of recommendations that promote engagement among nurses, such as local auditing and resource/link nurses, may lead to culture change in workplaces and greater ownership of hand hygiene behaviours.

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